Strategic Planning Branch **REPORT**

A Model of the Retail Markets in Alberta and Edmonton

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Research Paper No. 13

MODEL OF THE RETAIL MARKETS IN ALBERTA AND EDMONTON

by

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IMPORTANT NOTE

This Technical Paper has been prepared by the Corporate Forecasting Group, Long Range Planning Branch, Planning and Building Department. The paper documents research results as part of an ongoing forecasting activity. Neither the methods nor the results have been endorsed by the City of Edmonton.

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TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS

I INTRODUCTION 1

II THE THEORETICAL MODEL 2

1. Retail Sales
2. Employment
3. Income
4. Interest Rates
5. Consumer Prices
6. Population
7. Economic Growth

III ESTIMATION OF THE MODEL 4

IV SIMULATION AND FORECASTS 6

V POTENTIAL IMPLICATIONS AND CONCLUSIONS 7

BIBLIOGRAPHY 11

APPENDICES 12

A. List of Variables
B. Historical Data, 1971 - 1985

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A MODEL OF THE RETAIL MARKETS IN ALBERTA AND EDMONTON

I INTRODUCTION

The purposes of this report are: (1) to identify the factors which have an impact on Alberta's and Edmonton's retail sales; (2) to construct an econometric model which describes the causal relationships among these economic factors; and (3) to forecast retail sales for Alberta and Edmonton over next five years based on the model.

Retail trade has continued to be a growing sector of the Alberta and Edmonton economies. Based on Statistics Canada's data, retail sales increased 5% in 1986 over the previous year after a 14% rise in 1985. Even in a time of slow economic growth, Alberta was able to maintain the country's highest annual retail sales of $5,954 per capita (Ontario's figure was $5,784 and the national figure was $5,440). This strong performance in retail sales is also true in Edmonton, which has consistently maintained a higher rate of retail sales per capita than Calgary and Alberta. Based on Alberta Bureau of Statistics' data, Edmonton's annual retail sales were $8,020 per person in 1985, compared to $7,266 for Calgary and $6,795 for Alberta. (Note: Alberta Bureau of Statistics' data is based on a larger sample survey than Statistics Canada's. As a result, the two sets of data are different by about 18% in 1985).

A retail impact analysis for the Edmonton retail market has been completed (see Research Paper No. 6) and an assessment of the retail sales component of the Edmonton economy is being done by the Corporate Forecasting Group. The identification of the factors contributing to this major sector of the city's economy is one component of the development of an Edmonton econometric model. This model of the retail markets will become part of the large scale econometric model of the Edmonton economy. While the retail impact analysis deals only with Department Store Type Merchandise (DSTM) sales, the retail sales used in this paper cover all types of retail sales in Alberta and Edmonton.

Section 2 of the report describes each of the variables included in the model while Section 3 presents the estimation of the model using the ordinary least squares method and data for 1971 to 1985. A simulation of the model and forecasts of retail sales for Alberta and Edmonton over the period 1987-1992 are discussed in Section 4. Potential implications and conclusions are presented at the end.

II THE THEORETICAL MODEL

1. Retail Sales

The purpose of the model is to explore the relationship between retail sales and a series of factors which explain the changes in retail sales. The explanatory variables have been identified from a series of assumptions about retail sales. The proposed relationships were then tested by running regressions with different sets of variables to determine those most closely related to the changes in retail activity.

2. Employment

Employment was chosen as a factor in determining the level of retail sales because employment levels show the number of people who are wage earners and who have more disposable income for consumer spending than non-wage earners. People are assumed to be more likely to commit themselves to purchases, especially larger non-essential items, or to spend more on essential items, if they are employed. Therefore, it is assumed that higher employment levels will increase retail sales while lower employment levels will decrease retail sales.

Edmonton's retail outlets supply the population of areas beyond the city boundary, therefore the employment figure for Edmonton CMA was used for Edmonton's retail sales and Alberta's employment was employed for Alberta's retail sales.

3. Income

Average weekly earnings for Alberta and Edmonton CMA were included initially as variables for reasons similar to those outlined for employment. Higher average earnings imply more disposable income and a greater potential for retail sales. However, it was discovered that average weekly earnings did not produce satisfactory equations and per capita disposable income was substituted to achieve better results. The level of per capita disposable income is expected to have a positive relationship with retail sales. The income level was used in Alberta's and Edmonton's equations for retail sales.

4. Interest Rates

Interest rates are hypothesized to be a major determinant of purchasing decisions concerning large consumer items. A lower interest rate will reduce borrowing costs for consumers and tend to encourage purchases of large items such as cars, appliances, furniture, etc., resulting in a rise in retail sales. The relationship is therefore expected to be negative. The prime lending rate was used in the equations for Alberta's and Edmonton's retail sales.

5. Consumer Prices

To eliminate the inflation portion of the retail sales and purchasing power data, the consumer price index was used to deflate the personal disposable income and the retail sales figures. The consumer price index and inflation rates are also included in the model to explain the price effect on demand for consumer goods. The relationship between the consumer price index and retail sales is expected to be negative. This relationship was tested in both Alberta's and Edmonton's equations.

6. Population

The population of Edmonton Census Metropolitan Area is a basic factor which determines the size of the available Edmonton retail market and establishes the

limits for competition for Edmonton's retail sales, especially of basic goods. Alberta's population was applied to test Alberta's retail sales. The profile and characteristics of that population will, in turn, affect the relative strength of different retail sectors but a detailed breakdown was not required for present purposes.

7. Economic Growth

The rate of economic growth will affect the level of economic activity and consumer's confidence in the market. A high and positive economic growth rate will bring about a higher level of employment and higher income, thus a rise in retail sales. Therefore, the relationship between economic growth rates and retail sales is expected to be positive.

III ESTIMATION OF THE MODEL

The assumed relationships between retail sales and the factors discussed above were tested for the Alberta and Edmonton retail markets for the period 1971 to 1985, using the ordinary least squares method. The equations which have the best fit statistically are shown below. A list of variables and the 1971 to 1985 data for each variable are given in Appendices A and B.

(1) RSALE 81 = - 3109 - 32.833 IR - 19.116 CPI + 2.294 RPDY
(3.90) (1.18) (4.62) (6.77)

$R^2 = 0.9211$ $R^{-2} = 0.8996$ SEE = 217 DW = 1.75

(2) RSALE = RSALE 81 * CPI/100

(3) RSALA 81 = - 4098 + 3.5083 RPDY + 36.0103 GDPR - 75.8455 CPIR
(5.52) (18.14) (1.55) (2.55)

$R^2 = 0.9732$ $R^{-2} = 0.9659$ SEE = 317 DW = 2.30

(4) RSALA = RSALA 81 * CPI/100

Where:

RSALA 81	=	Alberta's retail sales, in (1981) millions of dollars.
RSALE 81	=	Edmonton's retail sales, in (1981) millions of dollars.
RSALA	=	Alberta's retail sales, in (current) millions of dollars.
RSALE	=	Edmonton's retail sales, in (current) millions of dollars.
IR	=	Average prime lending rate, in percent.
CPI	=	Consumer price index for Edmonton (1981 = 100).
CPIR	=	Inflation rates as measured by CPI, in percent.
RPDY	=	Per capita personal disposable income for Alberta, in 1971 dollars.
GDPR	=	Alberta's economic growth rate as measured by GDP, in percent.
R^2	=	Coefficient of multiple correlation.
R^{-2}	=	Coefficient of multiple correlation, corrected for degree of freedom.
SEE	=	Standard error of regression estimate.
DW	=	Durbin - Watson statistic.

For retail sales in 1981 dollars, Equation (1) shows that:

(i) for every 1% point decrease in average prime lending rate, Edmonton's retail sales will increase by $33 million;

(ii) for every one point decrease in Edmonton's consumer price index, retail sales will increase by $19 million; and

(iii) a $1 increase (in 1971 dollars) in real per capita disposable income will increase Edmonton's retail sales by $2.3 million.

The three explanatory variables in Equation (1) accounted for 92% of the changes in Edmonton's retail sales (in 1981 dollars) over the period 1971 to 1985.

Equation (3) indicates that, for Alberta's retail sales in 1981 dollars:

(i) for every $1 increase (in 1971 dollars) in real per capita disposable income, Alberta's retail sales will rise by $3.5 million;

(ii) for every 1% growth in the economy, Alberta's retail sales will increase by $36 million; and

(iii) for every 1% drop in the consumer prices, Alberta's retail sales will go up by $76 million.

The three variables together in Equation (3) explained 97% of the changes in Alberta's retail sales (in 1981 dollars) over the period 1971 to 1985.

Equations (2) and (4) are definitional equations which convert Edmonton's and Alberta's retail sales in 1981 dollars into retail sales in current dollars.

IV SIMULATION AND FORECASTS

By incorporating the above equations in the econometric model of the Edmonton economy (see Research Paper No. 14), a simulation can be done using the ESP software package. The only explanatory variable in the above equations which needs to be assumed is the value of interest rate; the value for all other explanatory variables can be determined by other equations in the Edmonton econometric model.

Based on the City Forecast Committee's assumptions, the prime interest rate will average 9.5% in 1987 and 1988, and thereafter decline by 0.25% point each year to 8.5% in 1992. Other external variables required for simulating the model, together

with their assumed values, for the period 1987-1992, are listed in Table 1; forecasts for the retail sales for the same period are shown in Table 2 and Charts 1 and 2.

As shown in Table 2, total retail sales in Edmonton are forecast to increase by 4.3% per year in current dollars from an estimated $4,783 million in 1986 to $6,163 million in 1992. After an adjustment for inflation, Edmonton's retail sales in 1981 dollars are expected to rise only 0.8% annually from an estimated $3,730 million in 1986 to $3,907 million in 1992. Alberta's retail sales are expected to increase by 5.2% per year in current dollars from $14,200 million in 1986 to $19,274 million in 1992. After an adjustment for inflation, Alberta's retail sales in 1981 dollars will go up by 1.7% per year from $11,068 million to $12,220 million over the same period.

V POTENTIAL IMPLICATIONS AND CONCLUSIONS

The low forecasted growth in Edmonton's retail sales between 1987 and 1992 will have a number of implications for the planning and development of retail facilities in Edmonton. The most significant impact will likely be a heightening of competition among retailers and developers which, in turn, will influence the growth and upgrading of retail floorspace. The tendency of the retail sector to seek new and more modern facilities during highly competitive periods should continue to support significant investment in retail development, although at a lesser rate of growth than has been seen in recent years.

The likely implications for the retail sector include:

(1) Only selected new construction projects will proceed in a low growth situation. These are projects addressing excellent market opportunities or projects where the failure to develop will significantly delay or result in a loss of the development opportunity. Examples are the Mill Woods Town Centre and the Eaton Centre.

(2) Major upgrading of retail facilities will occur where a market position could be in jeopardy, when competitive market position must be protected or where operational adjustments may have failed to reverse market decline.

(3) Consolidation of retail uses into prime commercial locations will continue. Some retailers will move from industrial to megastrip locations to maintain market share (see Research Paper No. 15), while other retail uses will establish in industrial areas because of lower rents (see Research Paper No. 12). Non-retail commercial uses will locate in vacant and less attractively located retail space and other commercial uses not usually requiring good visibility or access will be solicited.

(4) Non-development related implications will focus on improving productivity and efficiency. Major retail concentrations, such as the downtown and West Edmonton Mall, will continue to evolve and market towards their perceived strengths - the office worker market and the consumer seeking retail and amusement related recreation, respectively. Trends toward specialization of retail functions will continue as new retailing ideas are brought into Edmonton to help existing and developing shopping centres compete. Employment growth in retail will probably be in the part-time category as retailers attempt to control labour-related retail costs.

In conclusion, the model developed in this paper describes the impact of the most significant economic factors on retail sales in Edmonton and Alberta. These factors include personal disposable income, economic growth rates, interest rates and consumer prices. The retail model equations have been incorporated in the larger econometric model for the Edmonton economy and will be used to forecast future retail sales figures, based on various assumptions for different exogenous variables. The potential implication of the forecasted modest growth in retail sales - a heightening of competition among retailers and developers - are likely to result in further new/renovated facilities, relocations and new retail forms..

TABLE 1

ASSUMPTIONS ON EXTERNAL FACTORS

	World Oil Prices (US$/barrel)	Prime Interest Rates (%)	Canada's Unemployment Rate (%)	Alberta's Net Migration (thousand persons)	Canada's GDP Growth (%)
1986	15	10.50	9.6	-16.4	3.1
1987	19	9.50	9.3	-4.0	2.5
1988	22	9.50	9.1	3.0	3.0
1989	24	9.25	8.9	8.0	3.0
1990	26	9.00	8.7	10.0	3.0
1991	27	8.75	8.5	15.0	3.0
1992	28	8.50	8.3	15.0	3.0

Source: City of Edmonton Forecast Committee, Socio-Economic Forecasts 1987-1992, February 24, 1987.

TABLE 2

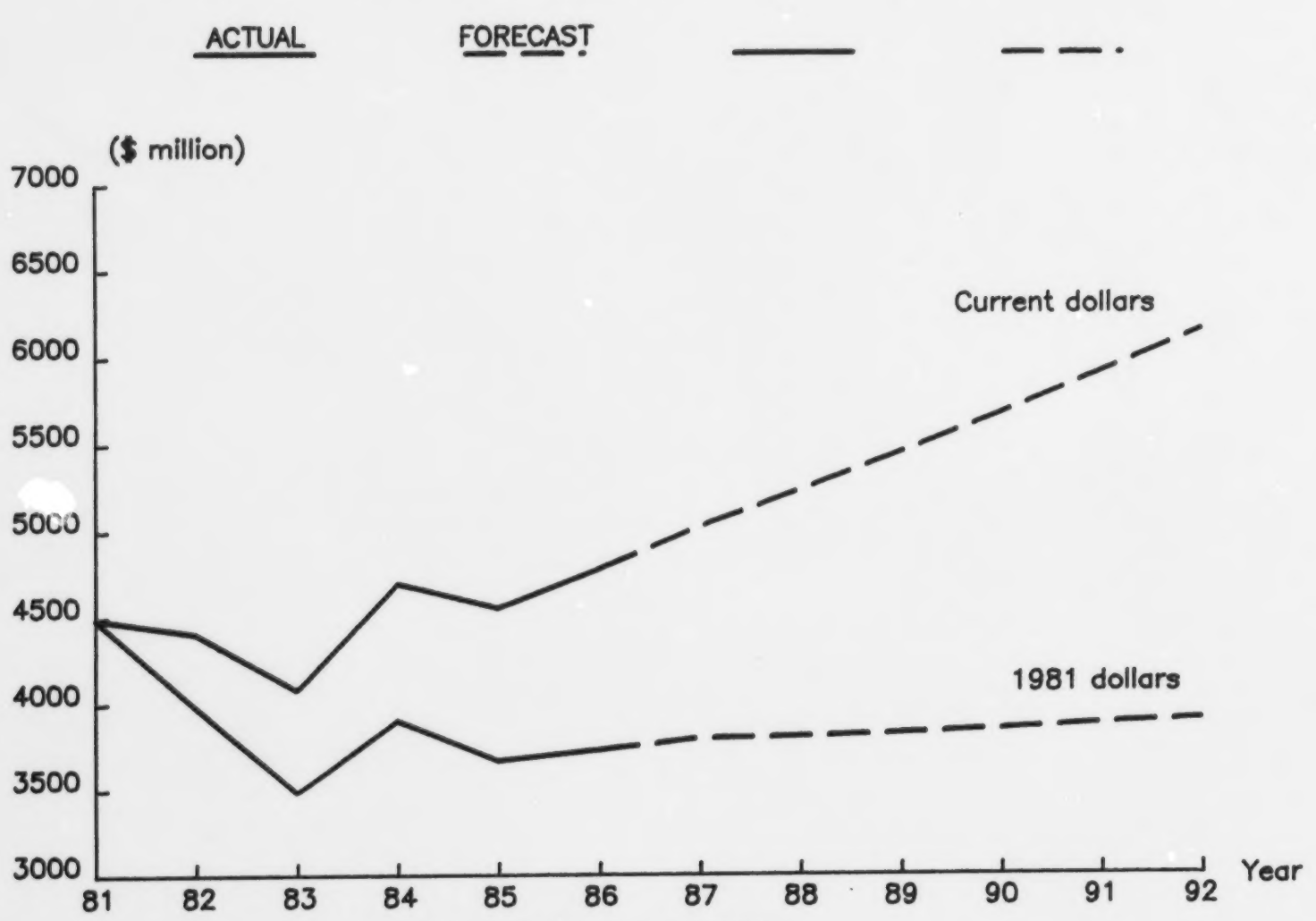
RETAIL SALES FORECASTS, 1986-1992

	Edmonton		Alberta	
	Current $ million	1981 $ million	Current $ million	1981 $ million
1986	4,783(e)	3,730(e)	14,200(a)	11,068(a)
1987	5,029	3,798	15,032	11,350
1988	5,240	3,809	15,782	11,471
1989	5,457	3,826	16,615	11,648
1990	5,682	3,851	17,477	11,845
1991	5,920	3,882	18,364	12,041
1992	6,163	3,907	19,274	12,220

Notes: (e) estimates
(a) actuals

Sources: The City of Edmonton Planning and Building Department

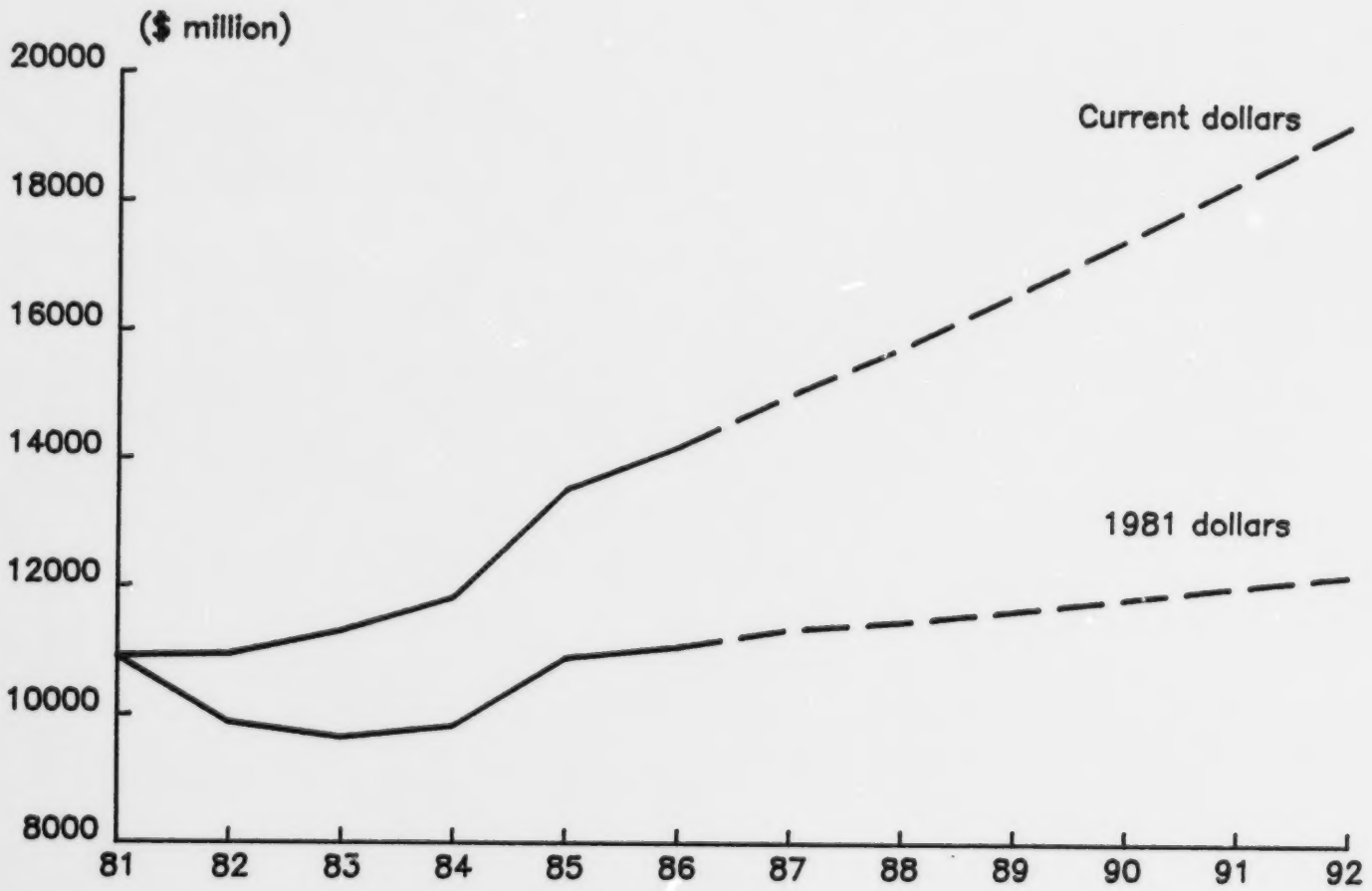
CHART 1
EDMONTON RETAIL SALES 1981 – 1992



Sources: Actuals: Alberta Bureau of Statistics

Forecasts: City of Edmonton Planning & Bldg Dept.

CHART 2
ALBERTA RETAIL SALES 1981 – 1992



Sources: Actuals: Statistics Canada

Forecasts: City of Edmonton Planning & Bldg Dept.

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7. Statistics Canada, Retail Trade, Catalogue No. 63-055.

APPENDIX A

LIST OF VARIABLES

IR	Prime interest rate, in percent
CPI	Consumer price index for Edmonton, 1981=100.
RSALA	Retail sales for Alberta, in millions of dollars.
RSALE	Retail sales for Edmonton, in millions of dollars.
EMPE	Edmonton employed labour force, in thousands of persons.
RPDY	Alberta's per capita disposable income, in 1971 dollars.
RSALA 81	Alberta's retail sales, in 1981 millions of dollars.
RSALE 81	Edmonton's retail sales, in 1981 millions of dollars.

APPENDIX B

HISTORICAL DATA, 1971-1985

YEAR	IR (%)	CPI (1981=100)	RSALE ($ million)	RSALA ($ million)
1971	5.48	41.9	1,008	2,422
1972	6.00	43.8	1,153	2,728
1973	7.65	47.6	1,352	3,070
1974	10.75	52.1	1,714	3,734
1975	9.42	57.7	2,094	4,556
1976	10.04	62.3	2,301	5,290
1977	8.50	68.0	2,720	5,927
1978	9.69	74.1	3,174	6,798
1979	12.90	80.7	3,742	8,052
1980	14.25	88.9	4,038	9,411
1981	19.29	100.0	4,492	10,906
1982	15.81	110.8	4,405	10,941
1983	11.20	117.2	4,079	11,304
1984	12.10	120.4	4,699	11,833
1985	10.70	124.3	4,555	13,524

YEAR	EMPE (thousands)	RPDY (1971 $)	RSALE 81 (1981 $ million)	RSALA 81 (1981 $ million)
1971	199	2,772	2,405	5,780
1972	193	2,979	2,632	6,228
1973	208	3,208	2,841	6,450
1974	233	3,412	3,290	7,167
1975	268	3,671	3,629	7,896
1976	278	3,696	3,693	8,491
1977	270	3,748	4,000	8,716
1978	290	3,899	4,283	9,174
1979	310	4,101	4,637	9,978
1980	332	4,237	4,542	10,586
1981	356	4,579	4,492	10,906
1982	347	4,239	3,976	9,875
1983	332	4,095	3,480	9,645
1984	328	4,173	3,903	9,828
1985	349	4,151	3,667	10,889

Sources: Statistics Canada, Alberta Bureau of Statistics, Bank of Canada